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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/988,688

11/20/2001

Tsunenobu Hori

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EXAMINER

PERRY, ANTHONY T

ART UNIT

PAPER NUMBER

2879

DATE MAILED: 02/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/988,688

Applicant(s)

HORI, TSUNENOBU

Examiner

Anthony T. Perry

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 10-13, 15, 17, 18, 20 and 22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-13, 15, 17, 18, 20 and 22 is/are rejected.
- 7) ☒ Claim(s) 1-8, 10-13, 15, 17, 18, 20 and 22 is/are objected to:
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/03/06 has been entered.

Cancellation of claim 21 has been entered.

Claim Objections

Claims 1-8, 10-13, 15, 17-18, 20, and 22 are objected to because of the following informalities:

Claim 1 recites the limitation "the second tip end" in line 10. There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 15 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Johnson (US 5,430,346).

Regarding claim 1, Johnson teaches a spark plug comprising a metal shell and a center electrode within and insulated from said metal shell (see col. 4, lines 4-12). Johnson teaches that a ground electrode opposes a tip end of the center electrode defining a spark gap there between,

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as well as the ground electrode being connected to the metal shell through a laser fused weld (col. 4, lines 42-50). The ground electrode extends vertically and horizontally from the metal shell (the ground electrode is L-shaped as called for in dependent claim 21) (for example, see Fig. 6).

Regarding claim 2, Johnson teaches the whole of the ground electrode being made of an alloy (col. 5, line 68 – col. 6, line 3). Johnson teaches the ground electrode being connected at an end thereof directly through a laser fused weld to the metal shell (col. 4, lines 42-50).

Regarding claim 15, Johnson teaches the tip portion (65) of the center electrode (18b) being made of a Pt alloy (see Fig. 26 and col. 5, lines 54-58).

Regarding claim 17, Johnson teaches the tip portion (65) of the center electrode (18b) being made of an Ir alloy (see Fig. 26 and col. 5, lines 54-58).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US 5,430,346).

Regarding claim 3, Johnson does not specifically state depth of the weld between the metal shell and the ground electrode. However, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a workable range for the welding depth so

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that ground electrode stays secured to metal shell throughout the use of the spark plug, since optimization of workable ranges is considered within the skill of the art.

Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US 5,430,346) as applied to claim 1 above, and further in view of Takafumi et al. (JP 63-266046).

Regarding claims 4-5, Johnson fails to specifically teach the composition of the metal shell. However, Takafumi teaches a composition of a metal shell for a spark plug that is made of an Fe-based alloy containing 0.15% by weight or less of S, 0.35% by weight or less of Si, 0.25% by weight or less of C, 1.5% by weight or less of Mn, and 0.1% by weight or less of P (see abstract). This composition provides a metal shell with excellent tensile strength (see abstract). Accordingly one of ordinary skill in the art at the time the invention was made would have found it obvious to have the metal shell with the above composition, as taught by Takafumi, so as to provide a spark plug with a metal shell having excellent tensile strength.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US 5,430,346) as applied to claim 1 above, and further in view of Franks (US 3,958,144).

Regarding claim 7, Johnson fails to specifically teach the ground electrode being made of 50 wt% or more of Ir. However, the Franks reference teaches that spark plugs having a ground electrode composed of more than 60 wt% of iridium with an additive of nickel produce a sparking operation considerably improved over previous spark plugs (col. 1, lines 44-64). Accordingly one of ordinary skill in the art would have found it obvious at the time the invention was made to use the ground electrode comprising of 60wt% of iridium with an additive of nickel, in place of the ground electrode taught by Johnson, so as to provide a spark plug with an improved sparking operation.

Claims 8, 10, 13, 18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US 5,430,346) in view of in view of Franks (US 3,958,144).

Regarding claims 8 and 13, Johnson teaches a spark plug comprising a metal shell and a center electrode within and insulated from said metal shell (see col. 4, lines 4-12). Johnson teaches that a ground electrode opposes the center electrode defining a spark gap there between, as well as the ground electrode being connected directly to the metal shell through a laser fused weld (col. 4, lines 42-50). Johnson does not specifically teach the ground electrode being made of an Ir alloy containing a main component of 50wt% or more of Ir.

However, the Franks reference teaches that spark plugs having a ground electrode composed of more than 60 wt% of iridium with an additive of nickel produce a sparking operation considerably improved over previous spark plugs (col. 1, lines 44-64). Accordingly one of ordinary skill in the art would have found it obvious at the time the invention was made to make ground electrode of 60 wt% of iridium with an additive of nickel in order to provide the spark plug with an improved sparking operation.

Regarding claim 10, Johnson does not specifically state depth of the weld between the metal shell and the ground electrode. However, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a workable range for the welding depth so that ground electrode stays secured to metal shell throughout the use of the spark plug, since optimization of workable ranges is considered within the skill of the art.

Reasoning for combination in the rejection of claims 8-9 and 13, above, apply.

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Regarding claim 18, Johnson teaches the tip portion (65) of the center electrode (18b) being made of a Pt alloy (see Fig. 26 and col. 5, lines 54-58).

Regarding claim 20, Johnson teaches the tip portion (65) of the center electrode (18b) being made of an Ir alloy (see Fig. 26 and col. 5, lines 54-58).

Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US 5,430,346) as applied to claims 8-9 and 13 above, and further in view of Takafumi et al. (JP 63-266046).

Regarding claims 11-12, Johnson fails to specifically teach the composition of the metal shell. However, Takafumi teaches a composition of a metal shell for a spark plug that is made of an Fe-based alloy containing 0.15% by weight or less of S, 0.35% by weight or less of Si, 0.25% by weight or less of C, 1.5% by weight or less of Mn, and 0.1% by weight or less of P (see abstract). This composition provides a metal shell with excellent tensile strength (see abstract). Accordingly one of ordinary skill in the art at the time the invention was made would have found it obvious to have the metal shell with the above composition, as taught by Takafumi, so as to provide a spark plug with a metal shell having excellent tensile strength.

Claims 1, 6, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeil (US 2,406,966) in view of Johnson (US 5,430,346).

Regarding claims 1, 6, and 22, Fig. 4 of the Pfeil reference shows a spark plug comprising a metal shell (10), a center electrode (5) retained in the metal shell and insulated from the metal shell, and a ground electrode (8) extending directly from the metal shell in a direction perpendicular to the longitudinal center line of the center electrode (5) so that it is opposed to the first tip end of the center electrode. The ground electrode is welded at an end thereof directly to the metal shell. Pfeil teaches that electrodes are commonly made of a

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platinum-iridium alloy having 80% platinum and 20% iridium (col. 1, lines 3-7) and that the electrode is connected directly to the metal shell by a welding material. Pfeil does not specifically teach the weld material being a laser fused weld.

However, Johnson teaches the ground electrode being directly connected to the metal shell through a laser fused welding material (col. 4, lines 42-50). It is well known in the art, that laser welding eliminates the necessity of tightly pressing the objects to be welded together, protecting them from unfavorable deformation. Also, laser welding provides a well-alloyed zone (molten zone) with minimum recrystallization forming a strong bond. Accordingly, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to use laser welding to attach the ground electrode to the metal shell of Pfeil so that the ground electrode and the metal shell are sufficiently molten due to the high density of its energy, producing a spark plug with a strong bond between its ground electrode and shell while also protecting the components from unfavorable deformation.

Response to Arguments

Applicant's arguments filed 1/03/06 have been fully considered but they are not persuasive.

With regards to the Applicant's arguments with respect the Johnson reference, the Examiner points out that the language "if the one includes peripheral surface" is optional and as such the recitation, "wherein said ground electrode has the second tip end facing the one, substantially along a line extending perpendicular to the longitudinal center line of said electrode," is not a required limitation. Johnson teaches the ground electrode opposed to the first tip end of the center electrode.

With regards to the Applicant's arguments with respect to the combination of Pfeil in view of Johnson, the Applicant is apparently arguing that "laser fused welding" is a type of laser welding. The Examiner first points out that the "laser fused weld" limitation in the claim is the actual material of the junction of the ground electrode and the metal shell created by laser welding. Secondly, the Examiner points out that all types of laser welding are types of **fusion welding** and has supplied a web document, entitled "Laser Welding Overview," that explains the basics of laser welding.

The Applicant goes on to argue that since Pfeil mentions that spot welding is **usually** used for applications of joining the ground electrode to the metal shell that one of ordinary skill in the art would not have been motivated to use laser welding. The Examiner notes that spot welding can be performed by using a laser beam. The supplied document, "Laser Welding Overview," states that laser conduction welds are used for spot welding. The Applicant argues that the ground electrode of Pfeil could not be attached by laser welding due to the specific constraints of controlling the local recrystallization. This is even more evidence that one of ordinary skill in the art would have been motivated to use laser welding, since laser welding allows for a more selective area to be welded, and certainly does not teach away from combination of Pfeil and Johnson.

Other Prior Art Cited

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Web document, "Laser Welding Overview," accessed on 2/19/06 from web page, http://www.engineesedge.com/manufacturing/laser_welding.htm.

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Contact Information

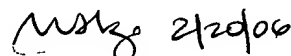
Any inquiry concerning this communication or earlier communications from the examiner should be directed to *Anthony Perry* whose telephone number is (571) 272-2459. The examiner can normally be reached between the hours of 9:00AM to 5:30PM Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel, can be reached on (571) 272-24597. **The fax phone number for this Group is (571) 273-8300.**

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Anthony Perry
Patent Examiner
Art Unit 2879
February 19, 2006



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